Dermatitis in the Oil Refining Industry*

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THIS paper is based on a study of 8 oil refineries employing about 14,000 men, of whom 4,500 were actually examined for the occurrence of dermatitis, and also on the sickness records of 11,000 of them over a period of 2 years.

The refineries studied used all varieties of crude oil obtained from North and South America, such as Pennsylvania, California, Ranger, Mid-Continental, Mexican, Peruvian, Venezuelan, and Texan. These crudes are classified as having paraffin, asphalt, naphthenic or mixed bases, and their character, as well as the final products desired, determines the refining process.

There were no marked differences in the skin conditions found in the various refineries using different crudes, except in those refineries where a paraffin base crude was used in the manufacture of paraffin.

PROCESS

The crude oil is distilled in batteries of stills and a number of cuts are made at different times in the process. Coke is the final residue in the still except where an asphalt base crude is used.

To remove various deleterious products from the distillates they are treated with sulphuric acid, caustic soda, fuller's earth, liquid sulphur dioxide, and sometimes "sweetening" with litharge and flowers of sulphur, or with sodium hypochlorite and chloride of lime.

Paraffin is obtained from the paraffin distillate of a paraffin base crude by passing it through a cooled plate press where the wax collects on the plates. The press is then opened and the wax is scraped off by hand, then purified by repeated "sweating" and by passing through bone black.

Some refineries manufacture various by-products, such as insecticides, greases, and wax products. The insecticides are made by using extract of pyrethrum flowers in various petroleum distillates. Greases are manufactured by mixing soap and lubricating oil in various proportions. Candles are made of paraffin by molding, or by dipping wicks repeatedly in the molten paraffin until the required thickness is acquired. Aniline dyes are used for coloring. No cases of dermatitis were observed in either the grease or the candle making, but many cases of dermatitis occurred in the manufacture of insecticides, due to hypersensitivity to pyrethrum flowers.

PRESENT SURVEY

The sickness records showed that 196 cases diagnosed as industrial dermatitis occurred among 11,000 workers during the period of 2 years.

In 1 refinery, where complete records were kept, of 16,000 treatments, 202 were skin cases which may have been of industrial origin, or about 1¼ per cent, and 128 skin cases that were diagnosed as not of industrial origin.

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In the present survey, 488 skin conditions were found, of which 25 were distinctly not of industrial origin.

The chief skin hazards in oil refining seem to be burns from explosions and fires, or from acids and alkalies. Oil acne and papillomata, as well as an excessive amount of epithelioma, result from oil and paraffin.

About 10 per cent of those examined showed on the dorsum of the hands and on the forearms, and sometimes even on the legs, many pin-head to pea-size flat, small, pigmented papillomata. These occur in greater proportion among machinists, mechanics, and laborers, whose hands are usually covered with oil, grease, and dirt. A similar condition has been described as occurring in about 25 per cent of men working in Dutch briquette factories.

Telangiectatic spots were found on the exposed parts of the skin of many of the laborers. They were from pin-head to dime size, and disappeared on stretching of the skin. They are caused by exposure to hot coke when cleaning out the residue from the stills, and also from dipping the hands into hot paraffin during the " sweating " process. It was noted that colored laborers did not show these spots.

Many observers have noted an excessive number of skin cancers among workers in oil and wax. In this study, 12 cases were encountered—3 on the face, 6 on the lip, 1 on the hand, 1 on the ear, and 1 on the scrotum. The last was on a paraffin pressman who also had an epithelioma on the dorsum of the hand.

Three of the refineries examined pressed paraffin, and 81 men who worked on the presses were examined. Characteristic wax warts were found on the hands and forearms of 25 of them. These wax warts differ in appearance from the papillomata described among workers in oil and grease. They are more raised, more verrucous, non-pigmented, and often occur on the inner surfaces, as well as the dorsum of the forearms and hands.

Among 81 paraffin pressmen, 19 cases of oil acne were found. Oil acne differs from acne vulgaris in that it occurs not on the face, but on the arms, the shoulders, the body, and the legs, and forms around the hair follicle. The lesions of oil acne are elevated, erythematous, indurated, and about pea size, and when they suppurate are known as wax boils. One case of epithelioma of the scrotum was found. This man also had many wax warts on his hands and forearms, one of which was undergoing epitheliomatous changes.

Burns are frequent in oil refineries. They occur from fires, explosions, cleaning hot coke from the stills, and also from the acids and caustics used in the refining process.

When acid tanks are being cleaned of sludge, and in that part of the plant where sulphuric acid is recovered and reconcentrated, acid burns are of frequent occurrence.

The tanks in which the oil and gasoline are neutralized with caustic soda must be cleaned at regular intervals, and caustic burns occur during this process, from contact with the caustic deposited on the sides of the tank. The cleaning of old barrels with caustic soda occasionally causes a dermatitis in a sensitive worker.

Sometimes a worker is met with, who after a number of years of work in the refinery becomes sensitized to gasoline and develops chronic dermatitis.

Epidermophytoses and tricophytides occur among refinery workers, as well as among the rest of the population, and are often mistaken for dermatitis of industrial origin. In the present study no attempt was made to examine the feet of the workers for tinea infections, but 11 cases of tinea of the hands and 1 of monilia infection of the webs of the fingers were found.

PREVENTIVE MEASURES

Most of the refineries provide safety appliances for the prevention of burns from acids, caustics, and coke. These appliances consist of rubber suits, goggles, and gas masks, which the men are compelled to wear when entering acid or caustic tanks. Nearly all of the refineries have shower baths placed throughout the area where acid and alkali burns are apt to occur, so that men splashed can immediately step under the showers. There are also large bath tubs filled with water so that men when burned can be immediately plunged into them.

The burns in coke stills usually occur in the old-style type, where there are manholes through which the men must enter to clean them. These are being replaced as soon as they are worn out with new-style ones in which mechanical means are employed for cleaning out the coke.

The pigmented papillomata occurring among workers in oil and grease could in a large measure be prevented by the compulsory wearing of gloves and compelling the men to wash their hands with soap and water at noon, before eating their lunch and immediately after they stop work for the day.

Oil acne and wax warts among the paraffin pressmen can also be prevented by compelling them to take shower baths, using plenty of soap, immediately after stopping work for the day, and changing to clean clothes. They should also be compelled to have their working clothes washed once a week because they become saturated with oil. In addition to this, the maintenance of an efficient medical and first-aid department, preferably with a full-time medical officer and a registered nurse, physical examination of new employees, and yearly examination of all employees are recommended.

The Controversy About Pasteurized Milk

THE controversy on the pasteurization of milk, described in previous letters, has been continued in the *Times*. A. Bradford Hill, W. W. Jameson and W. W. C. Topley, of the London School of Hygiene and Tropical Medicine, reply to the argument that in a population of 9,000,000 children in this country under the age of 15 only about 4,000 cases of bovine tuberculosis occur annually, or 1 case in 2,200 children per annum. The proportion of children who eventually suffer must be much higher. It can be estimated that between 1 in 100 and 1 in 200 children develop the disease before the age of 15. Milk-borne diseases other than tuberculosis are by no means as negligible as the opponents of pasteurization state. Between 1912 and 1931 there were reported at least 81 outbreaks of various diseases due to milk. In 1929 there occurred a severe epidemic of septic sore throat involving more than 1,000 families, with 65 deaths, and in 1931 an outbreak of 312 cases of paratyphoid fever, with 6 deaths.—London Letter, *J.A.M.A.*, June 23, 1934, p. 2124.